Notice of Allowability	Application No. 09/788,300	Applicant(s) VAHALA ET AL.	
	Examiner Michael P. Mooney	Art Unit 2877	Av

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *5/4/04 Amdt.*.
2. ☒ The allowed claim(s) is/are *9 and 15-46*.
3. ☒ The drawings filed on *16 February 2001* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 5/14/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

The prior art, either alone or in combination, does not disclose or render obvious that the resonator fiber further includes a taper positioner for engaging the fiber-optic-taper segment of at least one of the first and second transmission fiber optic waveguides so as to reproducibly establish and stably maintain an evanescent optical coupling of the fiber-ring resonator and at least one of the transmission fiber optic waveguides; at least one of the fiber optic taper segments of the first and second transmission fiber optic waveguides is partially wrapped around a portion of an outer circumference of at least one fiber-ring resonator segment; the resonator fiber includes a delocalized-optical-mode suppresor; and the resonant frequencies of the fiber-ring resonator segment have been modified by beam processing in combination with the rest of claim 9.

It is noted that the claim 9 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a plurality of optical resonators forming a coupled-optical-resonator system and including at least one fiber-ring optical resonator, the coupled-optical-resonator system being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first

transmission optical waveguide and the second transmission optical waveguide, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant optical modes in combination with the rest of claims 15-18, respectively.

It is noted that claims 15-18 are allowable because the unique combination of each and every specific element stated in the respective claim.

The prior art, either alone or in combination, does not disclose or render obvious a plurality of optical resonators forming a coupled-optical-resonator system and including at least one fiber-ring optical resonator, the coupled-optical-resonator system being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical Waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber

and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant optical modes, a spectral width of at least one resonance band of the coupled-optical-resonator system being smaller than an optical channel spacing of the optical WDM system in combination with the rest of claims 19-22, respectively.

It is noted that claims 19-22 are allowable because the unique combination of each and every specific element stated in the respective claim.

The prior art, either alone or in combination, does not disclose or render obvious a single fiber-ring optical resonator, the fiber-ring optical resonator being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, the fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to

support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant optical modes in combination with the rest of claims 23-24, respectively.

It is noted that claims 23-24 are allowable because the unique combination of each and every specific element stated in the respective claim.

The prior art, either alone or in combination, does not disclose or render obvious a single fiber-ring optical resonator, the fiber-ring optical resonator being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, the fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant optical modes optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical

mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant optical modes, a spectral width of at least one resonance of the fiber-ring optical resonator being smaller than an optical channel spacing of the optical WDM system in combination with the rest of claim 25.

It is noted that the claim 25 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a single fiber-ring optical resonator, the fiber-ring optical resonator being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, the fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an

outer circumferential surface of the fiber-ring optical resonator, the resonant optical kgnal being substantially resonant with at least one of the resonant optical modes, a spectral width of at least one resonance of the fiber-ring optical resonator being substantially equal to an optical channel spacing of the optical WDM system in combination with the rest of claim 26.

It is noted that the claim 26 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a single fiber-ring optical resonator, the fiber-ring optical resonator being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, the fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant

optical signal being substantially resonant with at least one of the resonant optical modes, at least one spacing between spectrally-adjacent resonances of the fiber-ring optical resonator being greater than an optical channel spacing of the optical WDM system in combination with the rest of claim 27.

It is noted that the claim 27 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a single fiber-ring optical resonator, the fiber-ring optical resonator being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, the fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least one of the resonant

optical modes, spectrally-adjacent resonances of the fiber-ring optical resonator being spaced by about an integer times an optical channel spacing of the optical WDM system in combination with the rest of claim 28.

It is noted that the claim 28 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a resonant optical component including at least one fiber-ring optical resonator, the resonant optical component being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator, the resonant optical signal being substantially resonant with at least

one of the resonant optical modes, at least one of the first transmission optical waveguide and the second transmission optical waveguide being a polarization-preserving optical fiber and the evanescent optical coupling segment thereof being a fiber-optic taper segment in combination with the rest of claim 29.

It is noted that the claim 29 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a resonant optical component including at least one fiber-ring optical resonator, the resonant optical component being evanescently optically coupled to each of the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segment thereof for transferring a resonant optical signal between the first transmission optical waveguide and the second transmission optical waveguide, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator. the resonant optical signal being substantially resonant with at least one of the resonant

optical modes, the resonator optical fiber including at least one delocalized optical-mode suppressor in combination with the rest of claim 31.

It is noted that the claim 31 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious the elements delineated in the respective claims paragraph ending with "...the resonant optical signal being substantially resonant with at least one of the optical modes..." and the accompanying variations in the remainder of the respective claim in combination with the rest of respective claims 30, 32-40.

It is noted that the claims 30, 32-40 are allowable because the unique combination of each and every specific element stated in the respective claim.

The prior art, either alone or in combination, does not disclose or render obvious routing a resonant subset of the received optical signals from the first transmission optical waveguide through the resonant optical component and into a second transmission optical waveguide, the second transmission optical waveguide being evanescently optically coupled to the resonant optical component, each of the resonant subset of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby dividing the non-resonant and resonant subsets of the received optical signals into the first and second transmission optical waveguides, respectively, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical

resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 41.

It is noted that the claim 41 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious routing routing the resonant subset of the received optical signals from the second transmission optical waveguide through the resonant optical component and into the first transmission optical waveguide, each of the resonant subset of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby combining the resonant and non-resonant subsets of the received optical signals into the first transmission optical waveguide, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of

at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 42.

It is noted that the claim 42 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious routing a resonant one of the received optical signals from the first transmission optical waveguide through the resonant optical component and into a second transmission optical waveguide, the second transmission optical waveguide being evanescently optically coupled to the resonant optical component, the resonant one of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby dropping the resonant one of the received optical signals from the first transmission optical waveguide into the second transmission optical waveguide, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of 'the resonator optical fiber so as to enable the resonator segment to support at least one resonant

optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 43.

It is noted that the claim 43 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious routing the resonant one of the received optical signals from the second transmission optical waveguide through the resonant optical component and into the first transmission optical waveguide, the resonant one of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby adding the resonant one of the received optical signals to the non-resonant subset of the received optical signals in the first transmission optical waveguide, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at ieast one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 44.

It is noted that the claim 44 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious routing a resonant subset of the received optical signals from the first transmission optical waveguide through the resonant optical component and into a second transmission optical waveguide, the second transmission optical waveguide being evanescently optically coupled to the resonant optical component, each of the resonant subset of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby dividing the non-resonant and resonant subsets of the received optical signals into the first and second transmission optical waveguides, respectively, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 45.

It is noted that the claim 45 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious routing a resonant one of the received optical signals from the first transmission optical waveguide through the resonant optical component and into a second transmission optical waveguide, the second transmission optical waveguide being evanescently optically coupled to the resonant optical component, the resonant one of the received optical signals being substantially resonant with at least one corresponding resonant optical mode of the resonant optical component, thereby dropping the resonant one of the received optical signals from the first transmission optical waveguide into the second transmission optical waveguide, the resonant optical component including at least one fiber-ring optical resonator, each fiber-ring optical resonator including a transverse resonator segment integral with a resonator optical fiber between first and second segments of the resonator optical fiber and having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the fiber-ring optical resonator in combination with the rest of claim 46.

It is noted that the claim 46 is allowable because the unique combination of each and every specific element stated in the claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Mooney whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1562.

Michael P. Mooney
Michael P. Mooney
Examiner
Art Unit 2877

Frank G. Font
Frank G. Font
Supervisory Patent Examiner
Art Unit 2877

FGF/mpm
7/10/04